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For Application No. 10/541,383

DESCRIPTION

IMAGE SUPPLY DEVICE, RECORDING SYSTEM, AND

CONTROL METHOD THEREFOR

TECHNICAL FIELD

The present invention relates to an image supply device such as a digital camera, a recording system, and a control method therefor.

BACKGROUND ART

In recent years, digital cameras (image sensing devices) which can sense images and convert them into digital image data by simple operations have been prevalent. When an image sensed by such a camera is printed and used as a photo, it is a common practice to temporarily download the sensed digital image data from a digital camera to a PC (computer), execute an image process by the PC, and output the processed image data from the PC to a color printer, thus printing an image.

By contrast, for example, a color print system which allows a digital camera to directly transfer digital image data to a color printer without the intervention of any PC and can print it out, a

so-called photo-direct (PD) printer which mounts a
memory card that is used in a digital camera and stores
sensed images and prints sensed images stored in the
memory card has recently been developed.

5   Particularly, in order to directly transfer image
data from a digital camera to a printer and print the
image data, demands have arisen for standardization of
interface specifications between a digital camera of
each manufacturer and a printer, the operation method,

10   and the like. One proposal for standardization is a
guideline for realizing a DPS (Direct Print System).

     However, in a case where a print process is
interrupted by disconnecting a cable connecting a
digital camera and a printer, or by turning off the

15   printer, during printing of image data from a digital
camera, details of restarting the print process by the
printer are not defined. The present invention,
therefore, proposes a method of realizing this.

20   DISCLOSURE OF INVENTION
     The present invention has been made in
consideration of the above situation, and has as its
feature to provide an image supply device capable of
increasing the process efficiency in restarting an

25   interrupted recording process, a recording system, and
a control method therefor.
     According to the present invention, there is

provided with an image supply device used in a
recording system in which the image supply device and a
recording apparatus are directly connected via a
communication interface, and image data is transmitted
5 from the image supply device to the recording apparatus
and recorded, characterized by comprising:
determination means for determining whether the type
of recording apparatus that is used is a type capable
of restarting recording in a case where a recording
10 process by the recording apparatus is interrupted;
instruction means for instructing the recording
apparatus to restart recording in a case where the
determination means determines that the type of the
recording apparatus is the type capable of restarting
15 recording process; and control means for controlling
the image supply device to designate recording
subsequent to interruption of the recording process to
record the image data in a case where the instruction
means instructs the restart of recording process.

20   Further, according to the present invention,
there is provided a method of recording with a
recording system in which an image supply device and a
recording apparatus are directly connected via a
communication interface, and image data is transmitted
25 from the image supply device to the recording apparatus
and recorded, the method comprising the steps of:
determining whether the type of recording apparatus

is a type capable of restarting recording in a case where a recording process by the recording apparatus is interrupted, instructing, by the image supply device, the recording apparatus so as to restart the recording

5 process, in a case where the type of the recording apparatus is determined to be the type capable of restarting recording process, and instructing, by the image supply device, the recording apparatus on recording subsequent to the recorded image data

10 together with the recording restart instruction.

Other features and advantages of the present invention will be apparent from the following descriptions taken in conjunction with the accompanying drawings, in which like reference characters designate

15 the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, which are incorporated

20 in and constitute a part of the specification, illustrate embodiments of the invention and, together with the descriptions, serve to explain the principle of the invention.

Fig. 1 depicts a schematic perspective view of a

25 PD printer according to an embodiment of the present invention;

Fig. 2 depicts a schematic view of the control

panel of the PD printer according to the embodiment;

Fig. 3 is a block diagram showing the arrangement of principal part associated with control of the PD printer according to the embodiment;

Fig. 4 is a block diagram showing the arrangement of a DSC according to the embodiment;

Fig. 5 depicts a view for explaining connection between the PD printer and a digital camera according to the embodiment;

Fig. 6 depicts a chart for explaining command exchange between the PD printer and the DSC in a print system according to a first embodiment;

Fig. 7 depicts a view for explaining an example of a print start command issued by the DSC according to the first embodiment;

Figs. 8A and 8B depict views for explaining JobStatus and DeviceStatus according to the embodiment;

Fig. 9 is a flow chart showing a print restart process by a DSC according to the first embodiment;

Fig. 10 is a flow chart for explaining a process by a DSC according to the embodiment;

Fig. 11 is a flow chart for explaining a process accompanying button operation for continuing printing in a DSC according to the first embodiment;

Fig. 12 is a flow chart for explaining a process accompanying button operation for aborting printing in the DSC according to the first embodiment;

Fig. 13 is a flow chart for explaining a process by a PD printer according to a second embodiment; and

Fig. 14 is a flow chart for explaining another process by the PD printer according to the second embodiment.

BEST MODE OF CARRYING OUT THE INVENTION

Preferred embodiments of the present invention will now be described in detail below with reference to the accompanying drawings.

Fig. 1 depicts a schematic perspective view of a photo direct printer (to be referred to as a PD printer hereinafter) 1000 according to an embodiment of the present invention. The PD printer 1000 has a function of receiving data from a host computer (PC) and printing the data as a general PC printer, and a function of directly reading and printing image data stored in a storage medium such as a memory card, or receiving image data from a digital camera and printing the data.

Referring to Fig. 1, a main body that forms the housing of the PD printer 1000 according to the embodiment has a lower case 1001, an upper case 1002, an access cover 1003, and an exhaust tray 1004 as exterior members. The lower case 1001 nearly forms the lower half portion of the PD printer 1000, and the upper case 1002 nearly forms the upper half portion of

the main body. These cases are combined to form a
hollow structure having a storage space which stores
mechanisms that will be described later. Openings
are respectively formed in the upper and front surfaces
5   of the main body. One end of the exhaust tray 1004 is
rotatably held by the lower case 1001, and rotation of
the tray 1004 opens/closes the opening formed in the
front surface of the lower case 1001. In executing a
print operation, the exhaust tray 1004 is rotated
10   toward the front surface side to open the opening.
Print sheets can be exhausted from the opening, and
sequentially stacked on the exhaust tray 1004. The
exhaust tray 1004 stores two auxiliary trays 1004a and
1004b. If necessary, the auxiliary trays 1004a and
15   1004b can be pulled out to enlarge/reduce the loading
area of print sheets in three steps.

One end of the access cover 1003 is rotatably
held by the upper case 1002 so as to be able to
open/close the opening formed in the upper surface. By
20   opening the access cover 1003, a printhead cartridge
(not shown), the ink tank (not shown), or the like
stored in the main body can be exchanged. Although not
shown, when the access cover 1003 is opened/closed, a
projection formed on the rear surface of the cover 1003
25   rotates a cover open/close lever. The open/close state
of the access cover 1003 can be detected by detecting
the rotation position of the lever by a microswitch or

the like.

A power key 1005 is arranged on the upper surface of the upper case 1002. A control panel 1010 which comprises a liquid crystal display unit 1006, various key switches, and the like is provided on the right side of the upper case 1002. The structure of the control panel 1010 will be described in detail later with reference to Fig. 2. Reference numeral 1007 denotes an automatic feeder which automatically feeds a print sheet into the apparatus main body. Reference numeral 1008 denotes a paper gap select lever which is used to adjust the gap between the printhead and a print sheet. Reference numeral 1009 denotes a card slot which receives an adapter capable of receiving a memory card. Image data stored in the memory card can be directly read and printed via this adapter. Examples of the memory card (PC) are a compact flash™ memory card, a smart media card, and a memory stick. Reference numeral 1011 denotes a viewer (liquid crystal display unit) which is detachable from the main body of the PD printer 1000, and is used to display an image for one frame, an index image, or the like when the user wants to search images stored in the PC card for an image to be printed. Reference numeral 1012 denotes a USB terminal which is used to connect a digital camera (to be described later). Also, another USB connector for connecting a personal computer (PC) is

provided on the rear surface of the PD printer 1000.

Fig. 2 depicts a schematic view of the control panel 1010 of the PD printer 1000 according to the embodiment.

5　　　　Referring to Fig. 2, the liquid crystal display unit 1006 displays menu items for various setups of data associated with items printed on the right and left sides of the unit 1006. The items displayed in the liquid crystal display unit 1006 include, e.g., the

10　first number or designated frame number of a photo to be printed (start/designate), the final photo number subjected to a printing end operation (end), the number of copies to be printed (copy count), the type of paper sheet (print sheet) used for printing (paper type), the

15　setup of the number of photos to be printed on one paper sheet (layout), the designation of print quality (quality), the designation as to whether or not to print a photographing date (date print), the designation as to whether or not to print a photo after

20　correction (image correction), the display of the number of paper sheets required for printing (paper count), and the like. These items are selected or designated using cursor keys 2001 by a user. Reference numeral 2002 denotes a mode key. Every time the mode

25　key 2002 is pressed, the type of printing (index printing , all-frame printing, one-frame printing, and the like) can be switched, and a corresponding one of

LEDs 2003 is turned on in accordance with the selected type of printing. Reference numeral 2004 denotes a maintenance key which is used to perform maintenance of the printer, such as cleaning of the printhead.

5   Reference numeral 2005 denotes a print start key which is pressed when the start of printing is designated or when the maintenance setup is settled. Reference numeral 2006 denotes a print cancel key which is pressed when printing or maintenance is canceled.

10   The arrangement of principal parts associated with control of the PD printer 1000 according to the embodiment will be described below with reference to Fig. 3. In Fig. 3, the same reference numerals as those used in previously-discussed figures denote parts

15   common to those in the above drawings, and a description thereof will be omitted.

        Referring to Fig. 3, reference numeral 3000 denotes a controller (control board). Reference numeral 3001 denotes an ASIC (an application specific

20   integrated circuit, e.g., a dedicated custom LSI (large scale integration circuit)). Reference numeral 3002 denotes a DSP (Digital Signal Processor) which incorporates a CPU (central processing unit) and executes various control processes (to be described

25   later), and image processes such as conversion from a luminance signal (RGB) into a density signal (CMYK), scaling, gamma conversion, and error diffusion.

Reference numeral 3003 denotes a memory having a program memory 3003a which stores a control program for the CPU of the DSP 3002, a RAM area has a memory area functioning as a work area which stores image data, and the like. Reference numeral 3004 denotes a printer engine. In the embodiment, the printer is equipped with a printer engine for an ink-jet printer which prints a color image by using a plurality of color inks. Reference numeral 3005 denotes a USB connector serving as a port for connecting a digital camera (DSC) 3012. Reference numeral 3006 denotes a connector for connecting the viewer 1011. Reference numeral 3008 denotes a USB hub (USB HUB). When the PD printer 1000 executes printing on the basis of image data from a PC 3010, the USB hub 3008, which is connected to the PC 3010 via an interface 1013, allows data from the PC 3010 to pass through it, and outputs the data to the printer engine 3004 via a USB 3021. The connected PC 3010 can directly exchange data and signals with the printer engine 3004 and execute printing (functions as a general PC printer). Reference numeral 3009 denotes a power supply connector which inputs a DC voltage converted from commercial AC power from a power supply 3019. The PC 3010 is a general personal computer. Reference numeral 3011 denotes a memory card (PC card) mentioned above; and reference numeral 3012 denotes the digital camera (to be also referred to as a DSC:

Digital Still Camera).

Note that signals are exchanged between the controller 3000 and the printer engine 3004 via the USB 3021 or an IEEE1284 bus 3022.

5   Fig. 4 is a block diagram showing the arrangement of the DSC (Digital Still Camera) 3012.

Referring to Fig. 4, reference numeral 3100 denotes a CPU which controls the overall DSC 3012; and numeral 3101 denotes a ROM (read only memory) which

10   stores the process sequence (control program) of the CPU 3100. Reference numeral 3102 denotes a RAM (random access memory) which is used as a work area for the CPU 3100; and numeral 3103 denotes a switch group which is used to perform various operations. The switch group

15   3103 includes various switches, cursor keys, and the like. Reference numeral 2700 denotes a liquid crystal display unit which is used to display an image photographed at present or a sensed/stored image and display a menu for performing various setups to the DSC

20   3012. Reference numeral 3105 denotes an optical unit which mainly comprises a lens and its drive system. Reference numeral 3106 denotes a CCD element; and numeral 3107 denotes a driver which drives and controls the optical unit 3105 under the control of the CPU 3100.

25   Reference numeral 3108 denotes a connector for connecting a storage medium 3109 (compact flash™ memory card, smart media card, or the like); and numeral 3110

denotes a USB interface (USB slave side) for connecting a PC or the PD printer 1000 of the embodiment.

Fig. 5 depicts a view for explaining the connection between the PD printer 1000 and the DSC 3012 according to the embodiment. The same reference numerals as those used in previously-discussed figures denote parts common to those in the above drawings, and a description thereof will be omitted.

Referring to Fig. 5, a cable 5000 comprises a connector 5001 which is connected to the connector 1012 of the PD printer 1000, and a connector 5002 for connecting to a connector 5003 of the digital camera 3012. The digital camera 3012 can output image data saved in an internal memory (memory card) via the connector 5003. The digital camera 3012 can take various arrangements, such as an arrangement which incorporates a memory as a storage means and an arrangement having a slot for inserting a removable memory. The PD printer 1000 and the digital camera 3012 are connected via the cable 5000 shown in Fig. 5, and image data from the digital camera 3012 can be directly sent to the PD printer 100 and printed by the PD printer 1000.

Operation examples of the print system according to the embodiment on the basis of the above arrangement will be explained as embodiments.

[First Embodiment]

The outline of the operation of a print system including a DSC 3012 and the PD printer 1000 based on the above arrangement will be described. In the print system according to the first embodiment, the DSC 3012

5   and the PD printer 1000 can operate in accordance with DPS (Direct Print System) specifications.

Fig. 6 depicts a chart for explaining a sequence when the DSC 3012 issues a print request to the PD printer 1000 to print in the print system according to

10 the first embodiment.

This process sequence is executed when the PD printer 1000 and DSC 3012 are connected via a cable 5000 and have confirmed that they comply with the DPS specifications. The DSC 3012 transmits

15 "ConfigurePrintService" to the PD printer 1000 to acquire information about the state of the PD printer 1000 (600). In response to this, the PD printer 1000 notifies the DSC 3012 of the current state (in this case, "idle" state) of the PD printer 1000 (601). The

20 DSC 3012 inquires about the capability of the PD printer 1000 (602), and issues a print start request (StartJob) corresponding to the capability (603). The print start request is issued on the condition that "newJobOK" (Fig. 8B) in the status information (to be

25 described later) from the PD printer 1000 is "True" in 601.

In response to the print start request, the PD

printer 1000 requests file information of the DSC 3012
on the basis of the file ID of image data to be printed
(604). In response to this, the DSC 3012 transmits
file information. The file information contains items
5   of information, such as the file capacity (file size),
the presence/absence of a thumbnail image, and file
attributes. When the PD printer 1000 receives the file
information and determines that the file can be
processed, the PD printer 1000 requests the file of the
10   DSC 3012 (605). The DSC 3012 sends image data of the
requested file to the DSC 3012. After that operation ,
when the PD printer 1000 starts a print process, the PD
printer 1000 sends status information representing a
"Printing" operation to the DSC 3012 as denoted by the
15   "NotifyDeviceStatus" information in 606. After a print
process of one page ends, the PD printer 1000 notifies
the DSC 3012 of the end of the print process by issuing
"NotifyJobStatus" information 607 at the start of
processing the next page. For printing of only one
20   page, the PD printer 1000 notifies the DSC 3012 of the
"idle" state by sending   the "NotifyDeviceStatus"
information 608 at the end of printing one requested
page. For N-up print of laying out a plurality of (N)
images on one page and printing them, the PD printer
25   1000 sends "NotifyJobStatus" information 607 to the DSC
3012 every time N images are printed. The issuing
timings of sending of the "NotifyJobStatus" information

and the "NotifyDeviceStatus" information and the image
data acquisition order in the first embodiment are
merely examples, and various cases are conceivable
depending on the product specification.

5   The print process includes a case in which the
file IDs of image data to be printed are contained and
transmitted at once in a print start request (StartJob)
from the DSC 3012 to perform printing , and a case in
which only the file ID of a DPOF (digital print order
10 format) file used in general photo development is
contained in a print start request (StartJob) from the
DSC 3012 and transmitted to the PD printer 1000, and
the PD printer 1000 interprets the DPOF file, acquires
the file ID of necessary image data, and performs
15 printing .

        Fig. 7 depicts a view for explaining an example
of a print start request issued by the DSC 3012 to the
PD printer 1000.

        In Fig. 7, numeral 720 denotes the configuration
20 (jobConfig) of the print job, and numeral 721 denotes
print information (printInfo).

        The configuration 720 will be explained. Numeral
700 (quality) designates the print quality such as
"normal" or "high quality". Numeral 701 (paperSize)
25 designates the paper size, and numeral 702 (paperType)
designates the paper type such as "plain paper", "photo
paper", or "ink-jet paper". Numeral 703 (fileType)

designates the type of an image file to be printed, and
when, for example, DPOF is used, the type representing
DPOF is designated by the file type 703. Numeral 704
(datePrint) designates whether or not to print a date,
5 numeral 705 (fileNamePrint) designates whether or not
to print a file name, numeral 706 (imageOptimize)
designates whether or not to optimize an image, numeral
707 (fixedSize) designates whether or not to perform
fixed-size printing , and numeral 708 (cropping)
10 designates whether or not to print a designated range
of an image.

The print information 721 contains a file ID 709
(fileId) and date information 710 (date).

Figs. 8A and 8B depict views for explaining items
15 of information contained in the JobStatus information
and the DeviceStatus information described above. The
JobStatus information (Fig. 8A) and the DeviceStatus
information (Fig. 8B) are transmitted from the PD
printer 1000 to the DSC 3012. The DSC 3012 can request
20 the PD printer 1000 to transmit these items of
information at an arbitrary timing.

In Fig. 8A, "prtPID", "ImagePath", and "copyID"
information become effective when print of a DPOF file
is designated.   "prtPID" information is identification
25 information (ID) of a print section designated by a
DPOF file.   "ImagePath" information is information of
a path for specifying an image file designated by the

DPOF file. "copyID" information designates the number of a copy during printing upon designating print of a plurality of copies. In printing based on a DPOF file, the DSC 3012 describes "fileID" information of the DPOF

5   file in a print start request (StartJob), and transmits the print start request to the PD printer 1000. In response to this, the PD printer 1000 can start printing the DPOF file. The PD printer 1000 acquires the DPOF file on the basis of the "fileID" information

10 of the DPOF file, executes the "GetFileID" operation, and specifies the "fileID" of an image file designated in the DPOF file. The PD printer 1000 requests the image file of the DSC 3012, and acquires the image data. As a result, an image designated in the DPOF file can

15 be printed. During execution of printing based on the DPOF file, the PD printer 1000 notifies the DSC 3012 by the "NotifyJobStatus" information that includes the "prtPID" information, the "ImagePath" information, and the "copyID" information representing the progress of

20 printing. The "prtPID" information, the "ImagePath" information, and the "copyID" information are stored in an internal memory in order to avoid printing the printed images again when the printing is restarted, in a case where it is possible to restart the printing

25 after the printing was interrupted.
      When the print process restarts after interruption due to any reason during printing of the

DPOF file, the print process restarts from a top of the page at which the print process was aborted.

"progress" information represents the current page (N/T) during printing out of a prospective number of pages. N represents the current print page, and T represents the total number of print pages to be printed.   "imagePrinted" information represents the number of printed images.

DeviceStatus information (Fig. 8B) will be explained.

"dpsPrintServiceStatus" information designates the state of the PD printer 1000, and is transmitted to the DSC 3012 from the PD printer 1000. "dpsPrintServiceStatus" information includes idle, print information, and pause states of the printer. "jobEndReason" information designates the end state of a print process, and is transmitted to the DSC 3012 upon the completion of printing the final page. "errorStatus" information represents an error state, and is transmitted upon generation of an error. "errorReason" information represents the cause of generation of the error, and is transmitted together with the "errorStatus" information.

"disconnectEnable" information refers to information indicating that printing is possible even if the USB cable 5000 is disconnected from the PD printer 1000. The PD printer 1000 notifies the DSC

3012 of the "disconnectEnable" information.
"capabilityChanged" information refers to information
indicating that the capability in the PD printer 1000
has been changed, and is transmitted to the DSC 3012.

5 "newJobOK" information refers to information indicating
that the PD printer 1000 can accept a print request,
and is transmitted to the DSC 3012.

Fig. 9 is a flow chart showing a print restart
process in the DSC 3012 according to the first

10 embodiment. A program which executes this process is
stored in the ROM 3101, and the CPU 3100 executes a
control process in accordance with the program to
realize the process.

In this process, the print operation is aborted

15 when, e.g., the cable 5000 is disconnected during
execution of a print job. After that, DPS reconnection
is established, the print button of the DSC 3012 is
designated, and the PD printer 1000 is instructed to
restart print operation. The PD printer 1000 then

20 restarts printing .

This process assumes that interruption of a print
process in the PD printer 1000 and interruption of a
print process in the DSC 3012 are recognized by the PD
printer 1000 and the DSC 3012.

25 In step S1, it is determined whether the DSC 3012
and PD printer 1000 have physically been connected by
connecting the cable 5000 or the like and DPS

reconnection has been established. If the connection
is established, the process advances to step S2. If
the DSC 3012 designates the restart of print, it is
determined whether the print process has been
5   interrupted. If the print process has not interrupted,
the process advances to step S3 to perform a normal
print process, such as a process of newly starting the
print process in accordance with a print instruction.

       If the print process has been interrupted, the
10 process advances to step S4. It is determined whether
the PD printer 1000 which has the newly established
connection is of the same model (same <dpsVersion> and
<productName>), a model of the same manufacturer
(<productName>), or a model of the same vendor
15 (<vendorName>) as that of the PD printer 1000 which has
interrupted the previous print process. In this
procedure, the model of the PD printer 1000 is
determined on the basis of the contents of information
sent as a response from the PD printer 1000 for
20 "ConfigurePrintService" information issued by the DSC
3012. When the same PD printer is reconnected, no
problem occurs. Even for a printer of another model,
if the manufacturer or vendor of the printer is the
same and a re-print process according to the first
25 embodiment is possible on the basis of the design of
the manufacturer or vendor, restart of printing can be
determined to be possible, and the process advances to

a subsequent process S6. If NO in step S4, the process
advances to step S5 to determine that continuation of
print process is impossible, and display a message on
the display unit 2700 of the DSC 3012. If necessary,
5   the UI (user menu window) displayed on the display unit
2700 may be changed.

   If the reconnected apparatus is determined in
step S4 to be of a compatible model, the process
advances to step S6 to determine whether print process
10 is performed using a DPOF file. If YES in step S6, the
process advances to step S7 to transmit the file ID of
the DPOF file to the PD printer 1000. In this case,
"prtPID" information, "ImagePath" information, and
"copyID" information described above are transmitted
15 together with the file ID of the DPOF file, thereby
designating a file subjected to the restart of print
process using the DPOF file.

   If the print process is not performed using DPOF
file in step S6, i.e., each image file is to be
20 designated and printed, the file IDs of image files
except printed image files among the file IDs of image
files to be printed are transmitted at once to the PD
printer 1000 to execute printing . Note, as a print
restart instruction, a print button is designated among
25 the operation buttons of the DSC 3012 to send the
"StartJob" instruction from the DSC 3012 to the PD
printer 1000 and print process is restarted.

The PD printer 1000 notifies the DSC 3012 of the end of printing of each page by the "jobStatus" information (meaning the start of printing of the next page) sent from the PD printer 1000 at the start of the

5   next page, or the "jobEndReason" information contained in the "deviceStatus" information for the final page. The DSC 3012 can, therefore, confirm the number of printed images. Whether the print process has been interrupted can be determined based on whether the

10 number of images designated by a print instruction have been printed when images are printed one by one, or from the progress (the "prtPID" information, the "ImagePath" information, and the "copyID" information) in a DPOF file or whether the print process has been

15 completed when the print process is based on the DPOF file.

When one image is printed on one page, the number of print paper sheets coincides with the number of images. When, however, a plurality of (N) images are

20 laid out and printed on one paper sheet, the number of images to be printed does not coincide with the number of print paper sheets. The DSC 3012 must make the number of print paper sheets and the number of image data match with each other in accordance with the print

25 mode.

When date print <datePrint> information 704 in the <jobConfig> information 720 in Fig. 7 is designated,

the <date> information 710 contained in the <printInfo>
information 721 is printed. When the date print
<datePrint> information 704 in the <jobConfig>
information 720 is not designated, date data is ignored

5   and is not printed even if the <date> information 710
is contained in the <printInfo> information 721.

        This can increase the degree of freedom of data
contained in the <printInfo> information 721. A
startJob command can be created by, e.g., directly

10 pasting, to the <printInfo> information 721, image data
and a date list which are used by another job.

        Fig. 10 is a flow chart for explaining a process
in a print system according to the first embodiment of
the present invention.

15   In the embodiment, when the DSC 3012 issues any
command to the PD printer 1000 and the status of the PD
printer 1000 changes, the PD printer 1000 notifies the
DSC 3012 of the status by the "NotifyDeviceStatus"
information described above. However, when the state

20 of the PD printer 1000 does not change or a response is
delayed , the DSC 3012 determines (estimates) that a
prospective status change has occurred in the PD
printer 1000 by a previously issued command, and
executes a corresponding process. To confirm the state

25 of the PD printer 1000, the DSC 3012 issues a
"GetDeviceStatus" instruction to the PD printer 1000,
acquires information indicating the state of the PD

printer 1000, and executes a process corresponding to the acquired status of the printer.

An example of this process will be explained with reference to the flow chart of Fig. 10.

5   In step S10, a print start request "StartJob" is issued to the PD printer 1000. The process advances to step S11 to determine whether a predetermined status response "NotifyDeviceStatus" is received from the PD printer 1000. If the PD printer 1000 is a product-type

10   capable of accepting only one print job, newJobOK information of the NotifyDeviceStatus information indicating that the PD printer 1000 can accept the next print job should be "False" after issuing the print start request "startJob" to the PD printer 1000. If a

15   normal response (the newJobOK information is "False") is received in step S11, the process advances to step S12 to wait until the "newJobOK" information changes to "True". Thereafter, a normal print process of issuing the next command or outputting image data or the like

20   in accordance with a request from the PD printer 1000 is executed.

In step S13, it is determined whether the "NotExecuted" information indicating that the "StartJob" operation could not be executed has been

25   received. If the "NotExecuted" information has been received, the process advances to step S20 to issue the "GetDeviceStatus" instruction to the PD printer 1000

and acquire the current status of the PD printer 1000.
If this status reveals the reason why the instruction
could not be executed, and the "StartJob" instruction
can be reissued, a message to this effect is displayed
5   on the UI of the display unit 2700 of the DSC 3012.
After then, if the user designates reissuing of an
instruction by using the button 3103, the process
advances from step S21 to S22 to reissue to the PD
printer 1000 the "StartJob" instruction which has not
10 been executed. If no reissuing designation is input in
step S21, the process advances from step S21 to step
S19.

    If no "NotExecuted" information has been received
in step S13, the process advances to step S14 to
15 determine whether the "NotSupported" information has
been received. If the "NotSupported" information has
been received, the process advances to step S15. In
this case, the previously issued "StartJob" instruction
is not supported by the PD printer 1000, and, for
20 example, non-supported items (impossible designation)
are displayed on the UI of the display unit 2700 so as
to represent that the print instruction is not
supported by the PD printer 1000.

    The meaning of not supporting the "StartJob"
25 instruction includes a case in which the PD printer
1000 does not support the "StartJob" instruction itself,
and also a case in which the PD printer 1000 supports

the "StartJob" instruction itself but does not support
the currently issued "StartJob" instruction because an
unsupported paper size or paper type is designated. In
this case, the UI of the DSC 3012 is so reconstructed
5   as to disable selection of an improper paper size or
paper type (items to be set for print operation),
similar to the above-described example. This can
decrease the possibility of receiving a "NotSupported"
indication again when a "StartJob" instruction is
10   executed again to the PD printer 1000. Note, upon
receiving the "NotSupported" information, a process of,
e.g., confirming a paper size or paper type supported
by the PD printer 1000 may be performed.

     If no "NotSupported" information has been
15   received in step S14, the process advances to step S11'.
This step assumes that the response content is
substantially "OK". If a predetermined status response
is received in step S11', the process advances to step
S12 to continue a normal operation. If no
20   predetermined status information is received in step
S11', the process advances to step S16 to determine
whether to continue the operation as a normal operation.
This may be displayed using the above-mentioned UI to
allow the user to select the normal operation. If the
25   process shifts to the normal operation, the process
advances to step S12. If the user does not input any
instruction and the process does not shift to the

normal operation, the process advances to step S17 to
request the status of the PD printer 1000 by using
"GetDeviceStatus". The process advances to step S18,
and the status of the PD printer 1000 is acquired and
5   if the status is an ordinary one, this status is
determined to be a normally estimated one, and the
process advances to step S12. If another status is
acquired, the process advances to step S19 to execute a
process corresponding to the acquired status.

10   The reason why unestimated "NotExecuted"
information has been sent back as a response in step
S13 is that, for example, when a PC 3010 is connected
to the PD printer 1000, a print instruction from the PC
3010 is received by the PD printer 1000 at almost the
15   same time as a print start request from the DSC 3012
and a print process of print data from the PC 3010 is
commenced. That is, since the DSC 3012 recognizes that
the "newJobOK" information denotes the value "True" in
advance on the basis of the NotifyDeviceStatus
20   information issued by the PD printer 1000, the DSC 3012
issues a "StartJob" command. However, immediately when
the "StartJob" command is issued, the "newJobOK"
information denoting the value "False" is set, and
the PD printer 1000 sends back "NotExecuted"
25   information as a response. The DSC 3012 which has
recognized that the "newJobOK" information denoting the
value "True" receives the unestimated response

"NotExecuted" from the PD printer 1000. The reason why
no predetermined status information has been received
in step S11 is that, for example, the PD printer 1000
is a product capable of accepting a plurality of print
5   jobs and even after a print request "StartJob" is
accepted, the "newJobOK" information of the
"DeviceStatus" information is kept unchanged as "True",
and thus the PD printer 1000 does not issue the
"NotifyDeviceStatus" information to the DSC 3012. Also
10   in this case, the DSC 3012 securely operates on the
assumption that the "newJobOK" information denotes that
value "False" until the state of the PD printer 1000
has been confirmed by the "GetDeviceStatus" instruction
(because of the possibility of delaying issuing of the
15   "NotifyDeviceStatus" information representing that the
"newJobOK" information denotes the value "False" due
to any cause).

     The above description assumes that, even when a
command from the DSC 3012 and a command from the PD
20   printer 1000 are almost simultaneously issued, both the
commands become effective. However, there may be also
a direct print specification: "of almost simultaneously
issued commands, a command from the DSC 3012 is
preferentially processed, and issuing of a command from
25   the PD printer 1000 is ignored and discarded". In this
case, step S11 determines "whether a command issued
from the PD printer 1000 has been received?". If YES

in step S11, the process advances to step S13 via a
step (not shown) of ignoring a command from the PD
printer 1000; if no command is received from the
printer 1000, the process directly advances to step S13.

5   In the above direct print specification, the
discarded command of the PD printer 1000 may be
reissued by the PD printer 1000. A case in which a
print instruction from the PC 3010 is received at
almost the same time as the "StartJob" instruction from

10   the DSC 3012 and a print process for printing data
from the PC 3010 is commenced will be exemplified. The
DSC 3012, which has recognized in advance that the
value of the "newJobOK" information is "True" in
response to the issuance of the NotifyDeviceStatus

15   information issued by the PD printer 1000 in advance,
issues a "StartJob" instruction. At almost the same
time, the PD printer 1000, which starts a print process
for printing data from the PC 3010, changes so that
the "newJobOK" information takes a value of "False".

20   In order to notify the DSC 3012 of this, the PD printer
1000 issues "NotifyDeviceStatus" information to the
DSC 3012. However, the "NotifyDeviceStatus"
information issued by the PD printer 1000 is discarded,
and the "StartJob" instruction issued by the DSC 3012

25   is preferentially processed. Since the PD printer 1000
has already changed the value of "newJobOK" information
to "False", it sends back "NotExecuted" information in

response to the "StartJob" instruction. At this time,
the PD printer 1000 must reissue the
"NotifyDeviceStatus" information in order to notify
the DSC 3012 that the value of the "newJobOK"
5   information is "False" . At this time, if the DSC 3012
issues the next command, instructions (commands) are
almost simultaneously issued from the two devices again.

     Basically, the situation in which the two devices
almost simultaneously issue commands and one of them is
10   discarded may occur when criterion statuses used to
issue commands from the two devices are different. In
this case, the direct print process becomes very
unstable and is in a dangerous state. Hence, the
situation in which the two devices almost
15   simultaneously issue commands is preferably avoided as
much as possible. For this purpose, for example, when
the DSC 3012 detects "issuing of a command from the PD
printer 1000" in step S11, issuing of a
"GetDeviceStatus" instruction may be inhibited in step
20   S20 or S17 for a predetermined time period to wait for
a command from the PD printer 1000.

     Also in the PD printer 1000 as a partner of the
direct print system, inhibition of issuing a command
from the PD printer 1000 for a predetermined time
25   period and waiting for a command from the DSC 3012 may
be set. If, however, these predetermined inhibition
time periods are equal, commands will be almost

simultaneously issued from the two devices after the
elapse of the predetermined time period. Considering
this possibility, the predetermined time period may not
be fixed and may be changed dynamically discontinuously
5   or irregularly. Alternatively, the inhibition time
period used when "issuing of a command by the PD
printer 1000 is not detected" in step S11 may be used
until "issuing of a command by the PD printer 1000 is
detected" in step S11, and updated when "issuing of a
10   command by the PD printer 1000 is detected" in step S11.
As a method of changing the timing of issuing command,
the issuing timing may be advanced. To prevent the two
devices from changing to the same timing, the timing
may be changed by a predetermined rule. For example,
15   the timing change method may be set depending on the
USB host or slave. Alternatively, both the DSC 3012
and PD printer 1000 may comprise means for generating
random timing signals, and command issuing timings may
be determined in accordance with the timing signals,
20   respectively. As described above, the PD printer 1000
may also be set to a state in which issuing of a
command from the PD printer 1000 is inhibited for a
predetermined time period, thereby decreasing the
possibility of almost simultaneously issuing commands
25   from the two devices. Various modifications described
above can also be applied.

     A process of continuing printing from the DSC

3012 in the print system according to the embodiment
and a process of interrupting print process will be
described. Also in this case, the arrangement of the
print system and those of the DSC 3012 and a PD printer
5 1000 are the same as those described above, and a
description thereof will be omitted.

Fig. 11 is a flow chart for explaining a print
continuation process executed when a print process in
the DSC 3012 according to the embodiment is interrupted
10 and then executed upon designating a print button which
designates the print start.

In step S110, it is determined whether the print
button among operation buttons 3103 of the DSC 3012 has
been designated. If NO in step S110, the process
15 advances to step S111 to execute another process such
as a process corresponding to a designated button or to
wait for an instruction inputted with a button. If the
print button has been designated, the process advances
to step S112. A "GetDeviceStatus" instruction is
20 issued to the PD printer 1000 to request status
information of the PD printer 1000 and acquire status
information sent from the PD printer 1000 in response
to the request. The process advances to step S113 to
determine on the basis of the acquired status
25 information whether the status of the PD printer 1000
is "pause". If YES in step S113, the process advances
to step S114 to determine whether an error has occurred

and a "Warning" is set (e.g., a cable is disconnected),
or it is determined that no error has occurred. If YES
in step S114, the restart of a print process is
determined to be possible (because the status from the
5 PD printer 1000 has been received). The process
advances to step S115 to instruct the PD printer 1000
to restart the print process (e.g., transmit a
"ContinueJob" instruction).

If no pause state is set in step S113 or another
10 error has occurred in step S114, the restart of the
print process is determined to be impossible, and a
message to this effect is displayed on the UI of the
display unit 2700. In this case, for example, a
message is displayed on the display unit 2700 to notify
15 the user that the print process cannot restart, and/or
selection of the print button is disabled. Wasteful
effort pressing the print button by the user can be
avoided by acquiring the statue of the PD printer 1000
before pressing the print button is determined in step
20 S110, and notifying the user whether ON/OFF of the
print button is effective.

Fig. 12 is a flow chart for explaining a print
abortion process executed upon designating a print
abortion button which designates abortion of a print
25 process in the DSC 3012 according to the embodiment.

In step S121, it is determined whether an
abortion button among the operation buttons 3103 of the

DSC 3012 has been designated. If NO in step S121, the
process advances to step S122 to execute another
process, such as a process corresponding to a
designated button, or waiting for the inputting of
5 another instruction in response to the use of a
button. If the abortion button has been designated
(pressed), the process advances to step S123. A
"GetDeviceStatus" instruction is issued to the PD
printer 1000 to request current status information of
10 the PD printer 1000 and acquire status information sent
from the PD printer 1000 in response to the request.
The process advances to step S124 to determine on the
basis of the acquired status information whether the
status of the PD printer 1000 is "pause". If YES in
15 step S124, the process advances to step S126; if NO, to
step S125 to determine whether printing progresses.
If YES in step S125, abortion of the print process is
determined to be possible, and the process advances to
step S126 to instruct the PD printer 1000 to abort the
20 print process (transmit "AbortJob").

　　　　If NO in step S125, abortion of the print process
is determined to be impossible, and a message to this
effect is displayed on the UI of the display unit 2700.
In this case, for example, a message is displayed on
25 the display unit 2700 to notify the user that printing
cannot be aborted, and/or selection of the abortion
button is disabled. Wasteful effort pressing the

abortion button by the user can be avoided by acquiring
the statue of the PD printer 1000 before pressing of
the abortion button is determined in step S121, and
notifying the user whether pressing of the abortion
5 button is effective.

[Second Embodiment]

    The above described embodiment is mainly
explained for a processing in the DSC 3012, but the
second embodiment will be explained for an operation in
10 a case where the PD printer 1000 acquires image data
from the DSC 3012. The hardware structures of the DSC
3012 and the PD printer 1000 are the same as those in
the first embodiment, so the descriptions of the
structures will be omitted.

15   Fig. 13 is a flow chart for explaining an image
data acquisition process in the PD printer 1000
according to the second embodiment of the present
invention. A program which executes this process is
stored in the program memory 3003a, and executed under
20 the control of the DSP 3002.

    This process starts when a print request
("StartJob") is sent from the DSC 3012 to designate the
start of a print process. In step S31, the
"GetFileInfo" instruction is sent to the DSC 3012 to
25 request information on an image file desired by the DSC
3012. In step S32, when information (file size,
attribute, or the like) on the image file is sent from

the DSC 3012, an item which is contained in the
information and represents the file capacity is
acquired. The process advances to step S33 to
determine whether the entire image file can be received
5   and processed at once. This is determined on the basis
of, e.g., the memory capacity of a free area in the
memory 3003 of the PD printer 1000. If reception of
all image data at once is determined to be impossible,
the process advances to step S34 to read out the image
10   file. A start address and read amount are designated
to request partial image data of the image file. This
is performed using the "GetPartialFile" instruction.
The DSC 3012 reads out the designated partial image
data from the image file in accordance with the start
15   address and read amount, and transmits the partial
image data to the PD printer 1000. The PD printer 1000,
which has received the partial image data in step S35,
processes and prints the partial image data in step S36.
The process advances to step S37 to determine whether
20   all image data of the image file have been printed. If
NO in step S37, the process returns to step S34 to
request the next partial image data. This process is
repetitively executed until the entire image file
designated in step S32 has been received and printed.
25   If it is determined in step S33 that image data
of the image file can be received and processed at once,
the process advances to step S38 to request all the

data of the image file of the DSC 3012. In step S39, all the image data of the image file sent from the DSC 3012 on the basis of the request are received and printed.

5   Fig. 14 is a flow chart for explaining another example of the image data acquisition process in the PD printer 1000 according to the second embodiment of the present invention. A program which executes this process is stored in the program memory 3003a, and

10 executed under the control of the DSP 3002.

This process starts when a print request ("StartJob") is sent from the DSC 3012 to designate the start of a print process. In step S41, the "GetFileInfo" instruction is sent to the DSC 3012 to

15 request information on an image file designated by the DSC 3012. In step S42, if information on the image file is sent from the DSC 3012, the process advances to step S43 to determine whether the image file contains thumbnail images (index images). If the image file

20 contains thumbnail images, the process advances to step S44 to determine whether index print is designated using the control unit 1010. If index print is designated, the process advances to step S45 to request the thumbnail image data of the DSC 3012 (issue

25 "GetThumb") and acquire the data. The process advances to step S46 to execute index print on the basis of the acquired thumbnail image data.

If the image file does not contain any thumbnail
image in step S43 or no index print is designated in
step S44, the process advances to step S33 (Fig. 13) to
execute the above-described image print process.

5   In this fashion, according to the second
embodiment, the image data amount acquired at once from
the DSC 3012 can be changed and input from the DSC 3012
in accordance with the memory capacity and process
performance of the PD printer 1000.

10   It can be detected in advance that a thumbnail
image has already been stored in the image file of the
DSC 3012. When index printing is designated in the PD
printer 1000, a thumbnail image creation process in the
PD printer 1000 can be omitted. Thus, a thumbnail
15 image (index image) can be quickly printed.

The present invention may be applied to a system
including a plurality of devices (e.g., a host computer,
interface device, reader, and printer) or an apparatus
(e.g., a copying machine or facsimile apparatus) formed
20 from a single device.

The object of the present invention is also
achieved when a storage medium (or recording medium)
which stores software program codes for realizing the
functions of the above-described embodiments (processes
25 performed on the camera side and various print processes
performed on the printer side) is supplied to a system
or apparatus, and the computer (or the CPU or MPU) of

the system or apparatus reads out and executes the program codes stored in the storage medium. In this case, the program codes read out from the storage medium realize the functions of the above-described embodiments, and the storage medium which stores the program codes constitutes the present invention. The functions of the above-described embodiments are realized when the computer executes the readout program codes. Also, the present invention includes a case in which the functions of the above-described embodiments are realized when an OS (Operating System) or the like running on the computer performs part or all of actual processing on the basis of the instructions of the program codes.

Furthermore, the present invention includes a case in which, after the program codes read out from the storage medium are written in the memory of a function expansion card inserted into the computer or the memory of a function expansion unit connected to the computer, the CPU of the function expansion card or function expansion unit performs part or all of actual processing on the basis of the instructions of the program codes and thereby realizes the functions of the above-described embodiments.

As has been described above, according to the embodiments, when a print process in the PD printer is interrupted by disconnecting a cable which connects the

DSC and the PD printer, and printing can be restarted by connecting the cable again, the print process can be reliably restarted to print.

Image data resent from the DSC to the PD printer is changed at the restart of the print operation between print processing based on a DPOF file and print processing of image data sequentially transmitted from the DSC to the PD printer. In either case, print operation can be reliably restarted.

When the DSC according to the embodiments issues a command such as StartJob or AbortJob to the printer, the DSC estimates that a predetermined state has been set even without any response from the printer, and can decide the next operation. The DSC further issues a command for confirming the status to the printer, and can identify the current state (status) of the printer.

When the printer sends back a specific status as a response to the DSC, the DSC commences a corresponding process. For example, for "NotExecuted" or "NotSupported", the DSC issues a command which inquires of the state of the printer for the former command, and decides the next command to be issued on the basis of the response from the printer. For the latter command, a previously issued command is not supported by the printer, and thus the DSC executes a process of, e.g., changing a UI displayed on the display unit so as not to subsequently issue the same

command. This can prevent resending of an unwanted command to the printer.

　　　According to the embodiments, the printer can adjust the image data amount to be acquired at once 5　from the DSC in accordance with the memory capacity and/or process performance of the printer. Image data can be loaded, processed, and printed by the printer.

　　　The present invention is not limited to the above embodiments and various changes and modifications can 10　be made within the spirit and scope of the present invention. Therefore, to apprise the public of the scope of the present invention, the following claims are made.